EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3692	(heat adj sink) same (transistor or MOSFET)	US-PGPUB; USPAT	OR	ON	2007/03/27 10:36
L2	2627	1 and @ad<"20021007"	US-PGPUB; USPAT	OR	ON	2007/03/27 11:45
L3	57	2 and (synthetic with resin)	US-PGPUB; USPAT	OR	ON	2007/03/27 10:42
L4	440	(heat adj sink) and semiconductor and (synthetic with resin)	US-PGPUB; USPAT	OR	ON	2007/03/27 11:02
L5	260	4 and @ad<"20021007"	US-PGPUB; USPAT	OR	ON	2007/03/27 11:33
L6	240	5 not 3	US-PGPUB; USPAT	OR	ON	2007/03/27 11:46
L7	45	(heat adj sink) and semiconductor and (synthetic with resin)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/03/27 11:38
L8	2	(("6249433") or ("6479888")).PN.	US-PGPUB; USPAT	OR	OFF	2007/03/27 11:26
L9	45022	"2001" and NEC	USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2007/03/27 11:27
L13	7943	9 and semiconductor	USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2007/03/27 11:28
L14	80	13 and (heat adj sink)	USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2007/03/27 11:32
L15	2956	438/122,124,127.ccls.	US-PGPUB; USPAT	OR	ON	2007/03/27 11:33
L16	1821	15 and @ad<"20021007"	US-PGPUB; USPAT	OR	ON	2007/03/27 11:35
L17	544	16 and sink	US-PGPUB; USPAT	OR	ON	2007/03/27 11:33
L18	2450	257/706,707,720.ccls.	US-PGPUB; USPAT	OR	ON	2007/03/27 11:35
L19	1637	18 and @ad<"20021007"	US-PGPUB; USPAT	OR	ON	2007/03/27 11:35
L20	1113	19 and sink	US-PGPUB; USPAT	OR	ON	2007/03/27 11:36

EAST Search History

L21	17	20 and (synthetic adj resin)	US-PGPUB; USPAT	OR	ON	2007/03/27 11:36
L22	234	(heat adj sink) and semiconductor and (epoxy with resin)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/03/27 11:45
L23	2936	(heat adj sink) and semiconductor and (epoxy with resin)	US-PGPUB; USPAT	OR	ON	2007/03/27 11:45
L24	1706	23 and @ad<"20021007"	US-PGPUB; USPAT	OR	ON	2007/03/27 11:46
L25	1696	24 not 3	US-PGPUB; USPAT	OR	ON	2007/03/27 11:46
L26	1598	25 not 6	US-PGPUB; USPAT	OR	ON	2007/03/27 11:46

US-PAT-NO: 5345106

DOCUMENT-IDENTIFIER: US 5345106 A

TITLE: Electronic circuit component with **heat sink** mounted on a lead frame

---------- KWIC ---------

Abstract Text - ABTX (1):

A standard lead frame has a carrier pierced to produce an opening sufficiently large to make room therein for the mounting of a semiconductor circuit chip. A **heat sink for the semiconductor** circuit chip is fastened into position in or just below the opening. The semiconductor circuit chip is then affixed directly to the **heat sink**. After wires have been bonded to connect contact areas of the chip to the conducting paths on the lead frame the unit is encapsulated in such a fashion that a major surface of the **heat sink** protrudes from the encapsulation. A standard lead frame may be used as the carrier.

TITLE - TI (1):

Electronic circuit component with **heat sink** mounted on a lead frame

Brief Summary Text - BSTX (2):

It has long been known to equip electronic power components with **heat sinks** in the form of heat conducting bodies for dissipating heat. These **heat sinks** are incorporated in most cases by inserting them into the casing mold mostly against the chip, as a result of which they come into heat conducting contact with the chip only through the mounting surfaces of the lead frames serving as the carrier. For surface-mountable components, it is also known to build the side of the casing that faces away from the circuit board as a **heat sink** and to attach cooling brackets to the circuit board. This construction can be accomplished only with correspondingly great utilization of space.

Brief Summary Text - BSTX (4):

It is an object of the present invention to avoid the disadvantages of the known **heat sink** constructions in electronic circuit components which need to dissipate heat.

Brief Summary Text - BSTX (6):

After connections have been made by bonding wires to contact areas on the

chip and to respective parts of the lead frame, the chip, its mounting and the surrounding area of the lead frame are encapsulated in a suitable conducting **synthetic resin,** but preferably a major surface of the heat conducting body protrudes outside of the encapsulation.

Brief Summary Text - BSTX (9):

The heat conducting body can advantageously be made by a block of a copper alloy or of aluminum, so that the thermal resistance from the chip to a cooling medium can be kept particularly small. Other measures provided by the invention for reducing the resistance to heat dissipation are the insertion of the heat conducting body in the mounting surfaces of the lead frames and the direct mounting of the chip on the heat conducting body. It is particularly advantageous that the heat can be conducted directly through the heat conducting body that serves as a **heat sink** and projects out of the encapsulation Of the chip to a suitable cooling medium. These advantages are particularly easy to obtain in surface-mountable power components carried on metal-core circuit boards, in which case the heat conducting bodies are put in direct contact with the metal core of the circuit board by suitable bonding processes with the circuit board, which then serves the function of a further cooling body.

Detailed Description Text - DETX (3):

FIG. 1b shows the lead frame prepared as just mentioned and also a heat conducting body 21, of which the surface 25 is so dimensioned that it lines up accurately with the aperture 20. Only peripheral strips 13' remain in FIG. 1b from the mounting surface 13 shown in FIG. 1a. The heat conducting body 21 serving as a **heat sink** is made of a block of metal, as already mentioned, and its thickness is many times that of the thickness of the lead frame.

Detailed Description Text - DETX (4):

Materials suitable for the **heat sink** 21 are those of high heat conductivity as for example copper alloys or aluminum. Since a chip 30 is to be mounted on the surface 25 of the heat conducting body 21, it can be advantageous for the better adhesion of the chip to deposit a silver, nickel, or gold layer by vapor-deposition or sputtering on the surface 25 or even some other material selected for the corresponding mounting process.

Detailed Description Text - DETX (5):

FIG. 1c shows the lead frame 10 after insertion of the heat conducting body 21 in the aperture 20. The connection of the heat conducting body 21 with the lead frame can be performed by squeezing, cold-welding, adhesive bonding or soldering at suitable locations 22. According to the nature of the surface 25

of the heat conducting body 21 the chip 30 can be affixed directly to the heat conducting body 21 by adhesion in case of a silver surface 25, by soldering in the case of a nickel surface 25 or by eutectic bonding in the case of a gold surface 25. The invention is not limited to these processes but extends to all suitable processes for mounting chips on **heat sinks**. The connections of the carriers of the chip 30 with connection paths on the surrounding portion of the lead frames can be produced by wire 32 bonded at both ends in the usual way.

Detailed Description Text - DETX (7):

In the example illustrated in FIG. 1d the connection extensions 12 of the lead frames are bent in a manner characteristic for a surface-mounted component. The component of the invention is particularly suitable for such surface-mounted electronic components for mounting on metal core circuit boards, in which case the **heat sink** 21 can, by a suitable process, be brought into contact with the metal core of the circuit board (not shown) that serves as a further cooling body. This represents a particularly space-saving solution of the problem of dissipation of heat from power, components mounted on circuit boards. The process illustrated in FIGS. 1a to 1d is also suited for components which are pressed through apertures in a circuit board (not shown) and are then soldered fast to the rear side of the circuit board.

US-PAT-NO: 5202288

DOCUMENT-IDENTIFIER: US 5202288 A

TITLE: Method of manufacturing an electronic circuit component incorporating a **heat sink**

---------- KWIC ---------

Abstract Text - ABTX (1):

A standard lead-frame has an aperture pierced to produce an opening sufficiently large to make room therein for the mounting of a semiconductor circuit chip. A **heat sink for the semiconductor** circuit chip is fastened into position in or just below the opening. The semiconductor circuit chip is then affixed directly to the **heat sink**. After wires have been bonded to connect contact areas of the chip to respective parts of the lead frame the unit is encapsulate such a fashion that a major surface of the **heat sink** protrudes from the encapsulation.

TITLE - TI (1):

Method of manufacturing an electronic circuit component incorporating a **heat sink**

Brief Summary Text - BSTX (2):

It has long been known to equip electronic power components with **heat sinks** in the form of heat conducting bodies for dissipating heat. These **heat sinks** are incorporated in most cases by inserting them into the casing mold mostly against the chip, as a result of which they come into heat conducting contact with the chip only through the mounting surfaces of the lead frames serving as the carrier. For surface-mountable components, it is also known to build the side of the casing that faces away from the circuit board as a **heat sink** and to attach cooling brackets to the circuit board. This construction can be accomplished only with correspondingly great utilization of space.

Brief Summary Text - BSTX (4):

It is an object of the present invention to avoid the disadvantages of the known **heat sink** constructions in electronic circuit components which need to dissipate heat.

Brief Summary Text - BSTX (6):

After connections have been made by bonding wires to contact areas on the chip and to respective parts of the lead frame, the chip, its mounting and the surrounding area of the lead frame are encapsulated in a suitable conducting **synthetic resin,** but preferably a major surface of the heat conducting body protrudes outside of the encapsulation.

Brief Summary Text - BSTX (9):

The heat conducting body can advantageously be made by a block of a copper alloy or of aluminum, so that the thermal resistance from the chip to a cooling medium can be kept particularly small. Other measures provided by the invention for reducing the resistance to heat dissipation are the insertion of the heat conducting body in the mounting surfaces of the leadframes and the direct mounting of the chip on the heat conducting body. It is particularly advantageous that the heat can be conducted directly through the heat conducting body that serves as a **heat sink** and projects out of the encapsulation of the chip to a suitable cooling medium. These advantages are particularly easy to obtain in surface-mountable power components carried on metal-core circuit boards, in which case the heat conducting bodies are put in direct contact with the metal core of the circuit board by suitable bonding processes with the circuit board, which then serves the function of a further cooling body.

Detailed Description Text - DETX (3):

FIG. 1b shows the lead frame prepared as just mentioned and also a heat conducting body 21, of which the surface 25 is so dimensioned that it lines up accurately with the aperture 20. Only peripheral strips 13' remain in FIG. 1b from the mounting surface 13 shown in FIG. 1a. The heat conducting body 21 serving as a **heat sink** is made of a block of metal, as already mentioned, and its thickness is many times that of the thickness of the lead-frame.

Detailed Description Text - DETX (4):

Materials suitable for the **heat sink** 21 are those of high heat conductivity as for example copper alloys or aluminum. Since a chip 30 is to be mounted on the surface 25 of the heat conducting body 21, it can be advantageous for the better adhesion of the chip to deposit a silver, nickel, or gold layer by vapor-deposition or sputtering on the surface 25 or even some other material selected for the corresponding mounting process.

Detailed Description Text - DETX (5):

FIG. 1c shows the lead frame 10 after insertion of the heat conducting body 21 in the aperture 20. The connection of the heat conducting body 21 with the lead frame can be performed by squeezing, cold-welding, adhesive bonding or

soldering at suitable locations 22. According to the nature of the surface 25 of the heat conducting body 21 the chip 30 can be affixed directly to the heat conducting body 21 by adhesion in case of a silver surface 25, by soldering in the case of a nickel surface 25 or by eutectic bonding in the case of a gold surface 25. The invention is not limited to these processes but extends to all suitable processes for mounting chips on **heat sinks**. The connections of the contact area of the chip 30 with connection paths on the surrounding portion of the lead frames can be produced by wire 32 bonded at both ends in the usual way.

Detailed Description Text - DETX (7):

In the example illustrated in FIG. 1d the connection extensions 12 of the lead frames are bent in a manner characteristic for a surface-mounted component. The component of the invention is particularly suitable for such surface-mounted electronic components for mounting on metal core circuit boards, in which case the **heat sink** 21 can, by a suitable process, be brought into contact with the metal core of the circuit board (not shown) that serves as a further cooling body. This represents a particularly space-saving solution of the problem of dissipation of heat from power components mounted on circuit boards. The process illustrated in FIGS. 1a to 1d is also suited for components which are pressed through apertures in a circuit board (not shown) and are then soldered fast to the rear side of the circuit board.

Claims Text - CLTX (13):

9. The method of claim 8, wherein said coating of said at least one chip is performed by pressing on a **synthetic resin** coating so that said at least one chip and at least said peripheral portions (13') of said mounting surface member (13) of said lead frame, said elongate support strips (14) of said lead frame and said bonding wires are embedded therein.

US-PAT-NO: 3906144

DOCUMENT-IDENTIFIER: US 3906144 A

TITLE: Film circuit assemblies

---------- KWIC ---------

Brief Summary Text - BSTX (6):
Conveniently, said cover is formed of **synthetic resin** material and the protective material is silicone **resin**.

Detailed Description Text - DETX (2):
Referring now more particularly to the drawing, the film circuit assembly shown therein comprises a support plate 10 which is formed of aluminium sheet, steel, or other material possessing a high thermal conductivity so as to serve as a **heat sink** for a thick film circuit 11 in the form of an aluminia substrate having resistors, capacitors and semiconductor devices on it. A plurality of indentations 12 are made in one surface of the support plate 10 so as to cause the formation of a corresponding number of pips 13 which project from the opposite surface of the plate 10 and which serve to locate the circuit 11 laterally with respect to the plate 10. A film of silicone grease 21 (FIG. 2) is smeared on said opposite surface of the plate 10 prior to mounting the circuit 11 thereon so that the circuit 11 will adhere to the plate by virtue of surface tension. It will be understood that silicone grease 21 possesses a very good thermal conductivity.

Detailed Description Text - DETX (3):
An open ended, hollow, cuboidal, **synthetic resin** cover 14 is then secured to the plate 10 by means of rivets 15 so that the plate 10 together with the cover 14 enclose the film circuit 11 and so that a cavity 16 is defined between the circuit 11 and the cover 14.

Claims Text - CLTX (3):
3. An assembly as claimed in claim 1 in which said cover is formed of **synthetic resin** material and the protective material is silicone **resin**.

PAT-NO: JP354149468A

DOCUMENT-IDENTIFIER: JP 54149468 A

TITLE: PRODUCTION OF RESIN SEAL-TYPE **SEMICONDUCTOR** DEVICE

PUBN-DATE: November 22, 1979

INVENTOR-INFORMATION:
NAME
MIYAGI, MITSUO

ASSIGNEE-INFORMATION:
NAME COUNTRY
OMRON TATEISI ELECTRONICS CO N/A

APPL-NO: JP53058581

APPL-DATE: May 16, 1978

INT-CL (IPC): H01L021/56

US-CL-CURRENT: 29/827

ABSTRACT:

PURPOSE: To make it possible to bury properly a **heat sink** into a resin mold by a simple constitution, namely, only by arranging a **heat sink** pressing material in a shaping metallic mold.

CONSTITUTION: Lead frame 1 is formed in, so to speak, single-in-line type because lead pieces 2 (2<SB>1</SB> to 2<SB>n</SB>) for connecting plural lead wires extending to one direction are linked and held by linking piece 3 and frame 4 in one body, and **heat sink** 5 is fixed to **semiconductor** element 6 through solder material layer 7, and lead pieces 2 of frame 1 are fitted to the

element setting face of **heat sink** 5 through insulating layer 8. Next, **heat sink** 5 is stored and arranged in space 11 of shaping metallic molds 9 and 10. **Heat sink** pressing material 12 which can be convex and concave is supported in space 11 of this metallic mold 9, and further, the spring force to the tip side is applied to this material 12 by spring 13. Insulating **synthetic resin** 15 melted under a state where **heat sink** 5 is pressed against bottom face 14 of space 11 by the tip of material 12 is injected to space 11, thus rerforming the **resin** mold of **semiconductor** 6.

US-PAT-NO: 6262480

DOCUMENT-IDENTIFIER: US 6262480 B1

TITLE: Package for electronic device having a fully insulated dissipator

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Brief Summary Text - BSTX (33):

The strip, with the dice assembled thereto, is then placed into a mold having corresponding cavities for the individual devices, for injecting an electrically insulating material in a molten state at a high temperature to form the plastic body of the package. This material is typically a **synthetic resin,** e.g. an epoxy resin. The transfer molding process is carried out in steps through which the temperature is varied gradually to avoid cracking the semiconductor material or in any way impairing the device reliability. After a first cooling step, and subsequent curing steps to promote thorough polymerization of the resin, the series of packages thus formed are removed from the mold.

Brief Summary Text - BSTX (75):

As will be described in connection with an embodiment of the invention, this can be readily achieved with conventional heat **sinks**. Illustratively, the trench depth, at least at the portion where the tip of the supporting element is accommodated, should be of the same magnitude as the tip height.

Brief Summary Text - BSTX (84):

Preferably, the trenches have a pair of openings, an inlet and an outlet on opposite side surfaces thereof, and constant depth. In addition, for heat **sinks** of commonly used shape, two symmetrically arranged trenches confer improved stability to the heat sink during the process of molding the plastic case in which it is fully embedded.

Detailed Description Text - DETX (65):

The molding apparatus used in the method of this invention is quite versatile. For example, each supporting element may be suitably pulled out of the mold and replaced with another element having a tip with different dimensions or shape, or a plug can be similarly inserted in its place. In this way, the number of the supporting elements can be varied to suit a specific

application, and where all the elements are removed, the same mold can be adapted for molding power packages with non-insulated heat **sinks**.

Current US Original Classification - CCOR (1):
257/706

Current US Cross Reference Classification - CCXR (3):
257/707